The introduction of the term premyelocyte (p. 49) for the non-granular cell with basophil cytoplasm which gives rise to the myelocytes is most regrettable, first because too many names have been given to this cell already, and secondly, because the very similar word promyelocyte has already been in use for some time to describe cells like those in plate i., Fig. 8, Nos. 3, 4, 5, *i.e.* early myelocytes with granules in a still basophil cytoplasm (Pappenheim). Likewise the term intermediate myelocyte is both clumsy and unnecessary when the word metamyelocyte is already well established (Pappenheim).

From what the author says on pp. 40, 48, 62, and his figure on plate xii., it is obvious that he confuses the Reizungsformen with the large mononuclears. They are absolutely distinct cells, only differing from the young megaloblast in that the narrow rim of cytoplasm is extremely basophil and free from hæmoglobin.

The most valuable thing in this book is the series of plates illustrating the author's macroscopic bone-marrow preparations. These are jewels of a pathological museum. Taken as a whole, the book contains very little that is new, and is not a serious contribution to science.

PROGRESS OF CLIMATOLOGY.

Handbuch der Klimatologie. By Dr. Julius Hann. Band i., Allgemeine Klimalehre. Dritte wesentlich umgearbeitete und vermehrte Auflage. Pp. xiv+394. (Stuttgart: J. Engelhorn, Bibliothek geographischer Handbücher, 1908.)

A NEW edition of Prof. Hann's well-known handbook of climatology will be greeted with pleasure by geographers and meteorologists alike. The second edition has been rendered accessible to English readers by Prof. De Courcy Ward's translation. The present edition has been largely extended and revised, and much recent work has been incorporated in it. The numerous references to original papers, a feature which the book shares with its fellow, the "Lehrbuch der Meteorologie," are specially welcome. They render the work no mere text-book, but a veritable encyclopædia to which the student will turn as a matter of course to ascertain what has been accomplished by others in the field in which he proposes to work.

In external features the book has gained considerably from an increase in the size of the page which makes it possible to set out tabular matter in more comprehensive style. The more detailed subdivision of the material into books, chapters and sections is also of great assistance to the reader.

A comparison of the two editions is of the nature of a survey of the progress of climatology in the past decade. Perhaps the most striking development lies in the greater prominence given to the question of radiation, which finds expression in an introductory section on solar radiation and in a considerable extension of the chapter on the solar or mathematical climate. Langley's work on the distribution of energy in the solar spectrum and the researches on the determination of the amount of radiation received from the sun, which are associated with the name of Angström, are dealt with, and open what is practically a new chapter in the science of climatology. The question of cyclical changes of climate has also come to the forefront in recent years, and the chapter thereon, with its numerous references, forms a useful summary of the present state of our knowledge of this question and of the allied one of the dependence of variations of terrestrial climate on solar phenomena. In this connection a bibliography of series of observations extending over long periods, many of them to the second half of the eighteenth century, is of great value. Prof. Hann endorses the generally accepted view that all available meteorological records show no permanent change of climate. On the wider question of a change of climate within historic times he preserves an open mind, and considers the usual statement that our climate is not changing to be a no more justifiable deduction from known facts than the reverse opinion.

Increased space is devoted to the consideration of methods of computing averages for temperature and rainfall from incomplete or short series of observations which shall be comparable with those deduced from long periods, a question which is of great importance in forming an estimate of the climatic factors of regions which have only recently been opened to civilisation. Finally, we mention an entirely new chapter on the great climatic zones of the globe, which gives a concise summary of the main features of the climate of each of the regions into which the earth's surface may be divided. We look forward with interest to the appearance of the second and third volumes of the book, which are to deal with the climates of special regions in greater detail.

R. G. K. L.

SOME NEW TEXT-BOOKS OF INORGANIC CHEMISTRY.

(1) *Cours de Chimie inorganique.* By F. Swarts. Pp. iv+706. (Paris: Librairie scientifique A. Hermann, 1908.) Price 15 francs.

(2) *A Text-book of Inorganic Chemistry.* By A. F. Holleman. Issued in English in cooperation with H. C. Cooper. Pp. viii+502. Third English edition, partly re-written. (New York: J. Wiley and Sons; London: Chapman and Hall, Ltd., 1908.)

(3) *General Chemistry for Schools and Colleges.* By Dr. Alexander Smith. Pp. xiii+529. (London: G. Bell and Sons, 1908.) Price 6*s.* 6*d.* net.

(4) *The New Matriculation Chemistry, specially adapted to the London University Matriculation Syllabus.* By Dr. G. H. Bailey. Pp. viii+528. Sixth impression, fourth edition; revised by H. W. Bausor. (Cambridge: University Tutorial Press, Ltd., 1908.) Price 5*s.* 6*d.*

(1) THE "Cours de Chimie," so the author states in the preface, is a reproduction of his course on general chemistry. Theoretical questions are discussed as they happen to occur, and, it may be added, these theoretical questions are treated in a manner which few first-year students of an English University would grasp. It speaks well for the previous training in mathematics and physics of the Belgian schoolboy that on

entering the university he can follow a course which involves the thermodynamics of chemical reactions. This is done, we are told :—

"Because it furnishes the demonstration of the law of Guldberg and Waage and of the principle of Le Chatelier, which, concurrently with the atomic hypothesis and the hypothesis of Arrhenius, serve as the basis of my teaching. It gives a precise notion of affinity, the primordial cause of all chemical transformations, and it affords an opportunity for discussing the significance of the principle of maximum work. Furthermore, I have wished to combat the unfortunate tendency often observed among engineering students, whose studies are largely mathematical, to consider chemistry as an empirical and descriptive science which appeals mainly to the memory."

In the latter object we should think Prof. Swarts has been successful, and we are only doubtful whether the student may not carry away the impression that chemistry is a branch of mathematics. Although somewhat advanced, according to our notions of an introductory course, the book is clearly written and printed in excellent type. It is also well illustrated, and the purely chemical information seems up to date.

(2) In writing a text-book of moderate dimensions which shall at the same time embrace the most recent developments of the subject there is a risk of superficiality, a risk which the author has not altogether succeeded in avoiding. Short sections are devoted to the mass law, the phase rule, transition temperatures, electrolytic dissociation, the theory of valency or valence, as Americans call it, induced reactions, colloids, the new gases of the atmosphere, radio-active elements, the rare earths of the cerium group, &c. The more elementary chemical information has to suffer occasionally in consequence. We would instance the treatment of flame, which is carried no further than that of the most elementary text-book. On the other hand, it must be admitted that the author has produced, if not a suggestive, at least an interesting book, and has managed to collect in a small compass a large amount of information. The appearance of a third edition is a sufficient testimony of public appreciation. As proofs of composition we should like to see the electrolysis of water and hydrogen chloride disappear once and for ever from the text-book. The first is untrue, and is usually contradicted in a later part of the book; but if the first is true the second can afford no satisfactory evidence of the composition of hydrogen chloride because water is invariably present.

We should also like to see consigned to the same limbo of questionable statements Lavoisier's authorship of the principle of the conservation of mass. We might with equal truth assign to him the statement of the principle of the conservation of energy, since he was the first to attach to the imponderable matter of heat or caloric a real and permanent existence. What are the facts? Simply that matter has for ages been regarded by the majority of philosophers as indestructible, and Lavoisier did no more than accept the principle and base his experiments upon it. Jean Rey, in his somewhat figurative style, states that "the weight with which each portion of matter is endowed at the cradle will be carried with it to the grave," whilst Boyle expresses himself still more clearly :—

"For it far exceeds the power of merely natural agents (and consequently of the fire) to produce anew so much as one atom of matter which they can but modifie and alter not create, which is so obvious a truth that almost all sects of philosophers have deny'd the power of producing matter to second causes."

Let us compare this statement with that of Lavoisier ("Elements of Chemistry," vol. i., p. 226, Kerr's translation) :—

"We may lay it down as an incontestable axiom, that in all the operations of art and nature, nothing is created; an equal quantity of matter exists both before and after the experiment; the quality and quantity of the elements remain precisely the same, and nothing takes place beyond changes and modifications in the combination of these elements. Upon this principle the whole art of performing chemical experiments depends. We must always suppose an exact equality between the elements of the body examined and those of the products of its analysis."

But this is nothing more than the axiom laid down by Boyle! That Lavoisier actually weighed his materials and products scarcely gives him the claim put forward by Prof. Holleman that he first introduced the principle of the conservation of mass into chemistry. Nor is Prof. Holleman more correct in saying that Lavoisier "assumed that gravity is an inseparable attribute of all matter." What about the *imponderable* matter of heat!

(3) Those who are acquainted with the many excellences of Prof. Alexander Smith's "Introduction to General Chemistry" will question the wisdom of publishing an abridgment of it for the use of schools and colleges. For the new volume is an abridgment in the sense that the arrangement, the illustrations, and page after page of the text are taken without modification from the original. This is unfortunate, because, if the matter is to be simplified for younger students, it must be expanded as well as curtailed, which is not the case. For example, of all subjects which demand clear and explicit treatment at considerable length, that on the measurement of gases should stand among the first. Yet we find the twelve pages forming an excellent chapter on the subject in the original cut down to less than five pages in the abridgment. The same is true of the section on catalysis; but the danger of this process is perhaps best illustrated on p. 89, where the expression "critical temperature" occurs without, so far as we can ascertain, any further explanation, whereas the original volume contains a very lucid account of critical phenomena in general. It seems scarcely worth while to issue at so small a difference in cost a volume so distinctly inferior to the original, which we regard, apart from the introductory chapters, as one of the best books on the subject.

(4) Little need be said about Dr. Bailey's "Matriculation Chemistry." It has long been recognised as a standard work of the "Tutorial" series. A book of such substantial proportions should, we think, carry the student not only well through the matriculation stage, but very considerably beyond it. The book is well arranged and full, almost too full, of information,

clearly set forth, and illustrated by numerous experiments and well-drawn diagrams. Its weak point, if it has a weak point, is that it is a little too didactic and not sufficiently suggestive. There is little to stimulate the student to ask himself or other people questions relating to what he has read, which may be partly due to the rather crowded mass of information. To take one example, the action of steam on various metals is described; some react and others do not. No comment is made or question raised as to the reason of this remarkable difference, and the student must be satisfied with the bare fact. J. B. C.

OUR BOOK SHELF.

The Theory and Practice of Bridge Construction in Timber, Iron and Steel. By Morgan W. Davies. Pp. viii+594. (London: Macmillan and Co., Ltd., 1908.) Price 12*s.* net.

THIS work is based upon notes of lectures delivered by the late Mr. Davies to students of civil engineering at the Swansea Technical College, and the aim the author had in view was to collect together a series of easily understood rules to enable problems of bridge design to be solved by graphical and analytical methods. The first two chapters are devoted to the routine problems connected with the bending moments and shearing forces of simple and built-in beams; then follow a series of chapters on stresses in the bars of framed structures; all the trusses which have been generally used in bridge construction are considered; in some cases graphical methods are employed, and in others, such as lattice girders and bow-string girders, analytical methods.

Special chapters are devoted to such subjects as the moment of resistance of beams, the strength and fatigue of iron and steel, the strength of columns, and the design of riveted joints. The various rules which have been proposed for fixing the working stresses in the different members of bridges are given, and their justification discussed; the recent failure of two long-span bridges in America emphasises the importance of this subject, and bridge engineers will be hardly likely in future to be any more enamoured of the rules laid down by certain well-known American bridge designers for the working stresses in struts than they have been in the past. The design of arches is very fully dealt with in chapter xiii.; both masonry and metallic arches are treated of, though, as is usual in text-books, much more space is devoted to the latter; this chapter will be one much consulted by the student, who generally finds more difficulty in determining the stresses in metallic arches, and in selecting suitable forms for the different members, than he does when dealing with ordinary trusses; the methods adopted by the author are clear and concise.

This chapter is followed by three which treat of suspension bridges, opening or draw bridges, and traversing or transporter bridges, and then by a chapter full of useful practical details on various types of bridge flooring, piers, and bolsters, or shoes, for distributing the pressure uniformly to the bearing plates. In the last chapter the author has worked out several complete examples of bridge design in order to illustrate the principles he has laid down in the earlier chapters; these examples include timber trestle bridges, highway bridges with steel main girders, a plate girder railway bridge, and, lastly, a Murphy Whipple truss railway bridge of 100-feet span. These examples will be of considerable service to the young designer and to the student.

T. H. B.

Metallic Alloys: their Structure and Constitution. By G. H. Gulliver. Pp. xv+254; illustrated. (London: C. Griffin and Co., Ltd., 1908.) Price 6*s.* net.

THE study of metallic alloys is a "practical" subject. Many alloys were discovered long ago by accident, and the development of their manufacture and use is based on empiricism. Even the recent introduction of a number of other alloys has owed little to theoretical considerations, and no attention is paid to predictions as to the properties of untried combinations. There is plenty of experimental evidence to be classified and discussed, but the time has hardly come for the logical method of treating the subject adopted by Mr. Gulliver. At any rate, the book would have been better balanced if more attention had been paid to the experimental data.

The author has adopted the classification of alloys presented by Roberts-Austen and Stansfield at the Congrès international de Physique in 1900. This classification was based on Roozeboom's study of equilibrium in mixtures, but the author has amplified it in many respects, and with its aid has been enabled to present a tolerably complete theory of alloys on a systematic basis. He has consistently applied the name "solution" to any physical mixture of metals, liquid or solid, and there is doubtless no disadvantage in this way of regarding them, though it has not much claim to be considered as a "method of study." One of the difficulties in applying the solution theory to alloys in practice is that equilibrium is not established in solid mixtures in any reasonable length of time under ordinary conditions. The alloys used in the industries are generally in an unstable state, and when equilibrium has been established in them it often happens that their usefulness has departed. This is, of course, one of the reasons why the recent study of alloys has not thrown more light on their useful properties.

The book, taken by itself, will not be of much use to engineers or manufacturers. It is not even quite what is wanted for students, but it may be recommended to their teachers. The weakest part of the book is that devoted to methods of investigation, which could have been made to afford much more help to those engaged in research. Its greatest claim to be read is that it gives a more complete classification of alloys than has hitherto been available.

(1) *Ex-meridian, Altitude, Azimuth, and Star-finding Tables.* By Lieut.-Commander Armistead Rust, U.S. Navy. Pp. li+393. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1908.) Price 21*s.* net.

(2) *Nautical Charts.* By G. R. Putman, Director of Coast Surveys, Philippine Islands. Pp. viii+162. (Same publishers, 1908.) Price 8*s.* 6*d.* net.

(3) *A Text-book of Theodolite Surveying and Levelling.* By Prof. James Park. Pp. x+216. (London: C. Griffin and Co., Ltd., 1908.) Price 6*s.* net.

(1) THE author has gathered together a very useful set of tables and diagrams for finding the latitude, facilitating the plotting of lines of position, and giving new and practical methods for identifying stars in cloudy weather. The tables extend from lat. 0°–65° and declination 0° 71′ north and south. The book is excellently printed and arranged; full descriptions of how to use the tables are given, together with examples. It should prove most useful to the mariner, as its scope covers practically all the navigable portions of the globe.

(2) This small volume, which deals with the methods of the U.S. Surveying Service, gives a very good general idea of how the work is carried out